of many varieties, and some of them are of high commercial value. The chief of these are the eucalypts, of which there are more than 150 species. Besides the eucalypts there are many kinds of casuarinas (the Australian oak), some conifers (the Moreton Bay pine, the cypress pine, the brown pine, or colonial deal, and others), many acacias (the Australian wattle), Banksias, and numerous other varieties. The range of Australian wood at present available for British commerce is limited. Western Australia and Tasmania are the only States that have seriously dealt with the question of exporting timber or of using their forest resources as a valuable commercial asset.

Mr. W. Powell described a process for seasoning and preserving timber which appears to be at once simple and effective. The timber is treated with a dilute solution of sugar, in which it is boiled until the air in the interstices has been got rid of. The timber is then cooled and dried at a fairly high temperature. Timber treated in this way is much improved, the soft woods especially, both in hardness and toughness.

EDUCATION AT THE BRITISH ASSOCIATION.

THE educational science section has become the debating ground where educational principles can be discussed without reference to minor administrative details and class distinctions. Increased efficiency is the leading idea, and it is promoted by the expression of authoritative opinion from a platform of the British Association. Attention is there directed to matters requiring consideration by authorities responsible for educational work, and the directions in which progress can be most usefully made are afterwards indicated in reports presented by committees. The work of the section is thus both critical and constructive, and its sphere of influence increases in extent every year.

After the president's address on the morning of September 10, a discussion on school curricula was carried on throughout that day and the next. The material for discussion consisted of eight papers received from leading representatives of various branches of educational work in response to an invitation issued by the committee of the section. The papers were printed in full in the September number of the *School World*, and the authors are Prof. J. Adams, Prof. H. E. Armstrong, F.R.S., Miss S. A. Burstall, Mr. G. F. Daniell, Mr. W. C. Fletcher, Mr. T. E. Page, Mr. J. L. Paton, and Prof. Michael E. Sadler. The three main divisions of the subject were:—(1) General principles upon which a school curriculum should be constructed; (2) the education of girls; (3) commercial education. To concentrate attention upon specific points, several propositions were formulated, and the authors of the papers were asked to speak to them instead of reading the papers. The propositions which were laid before the meeting during the discussion, and received general assent, were as follows:—

(1) It is desirable that specialisation should be deferred to as late a period as possible in the school career, and that the early curriculum should be so arranged as to lay a good foundation in English subjects, with, say, drawing and elementary science.

(2) It is to be regretted that the influence of public school entrance and scholarship examinations encourages the premature devotion of too much time to classics; it would be desirable that the study of Latin should not be taken before, say, twelve years of age, and that the language teaching up to that time should be confined to the mother tongue and one modern language.

(3) That a large measure of practical instruction should be included in the school course, and that both literary and practical instruction should be given throughout and made interdependent.

(4) It is desirable that in organising the curriculum there should be some differentiation, especially in science, between courses of study for boys and those for girls, more particularly between twelve and sixteen years of age.

(5) That for all girls literary instruction is of the highest importance; at some period of their school life practical instruction in the domestic arts should be provided, based on and correlated with elementary science teaching.

(6) With the view of obviating over-pressure, injury to health and superficiality, girls who intend to proceed to college, or enter a literary profession, should in general remain at school until eighteen years of age.

(7) It is desirable that county and borough councils and other authorities offering scholarships for girls to enable them to proceed to college should not expect them to take up their scholarships before they reach the age of eighteen.

It is impossible to describe in a few words the many important opinions expressed in the papers and during the discussion, but there was general agreement that the development of intelligence and self-reliance is of prime importance. The discipline of scientific studies was generally recognised, and also the necessity of making courses of instruction more practical than hitherto; that is to say, pupils should be active rather than passive in their attitude towards knowledge.

This is the touchstone which will test the quality of all educational work, whether in the humanities or in science, but as science deals with things more than words, it has special claims for recognition in the school curriculum. Mr. Balfour a short time ago, in referring to the relative advantages of classics and science as school subjects, expressed himself as doubtful whether scientific studies could supersede with advantage the traditional course of classics in schools. In connection with his remarks, it is of interest to refer to the following statement made by Mr. A. C. Benson in the *School World* for October in continuation of the discussion on curriculum:—"I have taught classics at Eton for nearly twenty years to boys of every degree of capacity. I have found that as a basis for teaching able boys they are excellent. But the effect of the present crowded curriculum, with classics as the basis, upon boys of ordinary or limited capacity is so absolutely negative, from the educational point of view, that I should hold that it would justify almost any experiment being tried."

Here we have an acknowledgment by a teacher of exceptional experience and ability of the failure of classical instruction so far as the average boy is concerned. This in itself is sufficient to justify the plea of the reformer for a readjustment of school studies on a broader basis than that at present adopted. In the discussion on curriculum, Mr. T. E. Page, a representative of literary culture, asked what branch of natural knowledge men of science wished to be taught in schools, and urged that there was a diversity of opinion upon this matter. The answer is, of course, that the subject is not so important as the method. It matters little whether botany, physics, chemistry, or any other science subject is used as the basis of instruction provided that they are studied practically under encouraging conditions and in the spirit of scientific inquiry. What men of science urge is that scientific studies are capable of forming habits of mind—resourcefulness, perspicacity, enterprise and initiative—in a way which the traditional courses and methods have not accomplished in the past.

A general view of the work done by the late Dr. Gladstone in connection with the teaching of science in elementary schools is contained in the final report of the committee on that subject. The committee was first appointed in 1878, with Mr. Mundella as chairman and Dr. Gladstone as secretary, and since 1883 has been annually reappointed to continue inquiries on the subject then instituted. The chief work of the committee has been to watch and record the proportion of children examined in science subjects in elementary schools. There has, of course, been a decided increase in numbers, but when the character of the work which has been done is considered, the committee now reports that the progress made is undoubtedly unsatisfactory. It is beyond question that science has in no way taken its proper place in our system of elementary education. Here and there work of the very greatest value has been done, but such cases are all too rare.

The report concludes with the remark that, in view of the national importance of developing the scientific spirit in elementary schools, it is not too much to say that it is now the duty of the Association to intervene with constructive proposals which will promote such an object. Judging from the great success which has attended the labours of the committee on the teaching of chemistry in schools and the recent discussion on the teaching of mathematics, there can be little doubt that a general inquiry might now be undertaken with great advantage, and that proposals might be made which would be of the greatest value

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in guiding educational authorities generally. A special committee has therefore been appointed to report upon the courses of experimental, observational and practical studies most suitable for elementary schools, and generally as to the steps which it is desirable to take to secure proper attention to and encouragement of such studies. All who have paid attention to the subject will probably agree that some organised effort should now be made to extend the teaching of scientific method.

The dangers of ill-considered schemes of science study were referred to by Prof. H. E. Armstrong in presenting the report of the committee on the teaching of science in elementary schools, and were emphasised by Prof. Marshall Ward in the subsequent discussion. The committee points out that education authorities, realising the value of nature-study as a means of training and a matter of interest, will force instruction in this subject in schools in which the teachers are quite unable to handle it effectively by reason of their want of scientific training and knowledge. It cannot be too strongly impressed upon the lay mind that unless nature-study is taken up as a subject by which the spirit of scientific inquiry is created and fostered, men of science have no sympathy with its introduction into schools.

The report on the teaching of botany in schools should do something to direct the nature-study movement along scientific lines. There is a tendency to consider that the demands of the advocates of nature-study in schools are met by supplying reading-books in which a variety of facts in natural history are described, and are accepted by the pupils on the *ipse dixit* of the author or the teacher who dispenses them. If that is to be the result of the movement, it would be just as well to read fairy tales or fiction, so far as the development of mental faculties is concerned. To be of any value as a training in scientific method, nature-study must not only create interest, but must also demand active work for a definite purpose from the pupils. The difficulties in the way of doing this under the present conditions of teaching in schools are very great, but unless this fundamental principle of scientific instruction is acted upon, nature-study will prove a snare and a delusion.

On the importance of studying plants alive and experimentally, the botany report expresses decided opinion. It is pointed out that scientific curiosity is better occupied in discovering how plants get their food, respond to stimuli, adapt their structures to new circumstances, contend with their rivals or enemies, and propagate their race than in learning Latin names for the shapes of their leaves or classifying species. Individual practical work is, in fact, the only way to gain useful scientific experience, for knowledge accumulated by a mere act of memory is feebly grasped and soon forgotten. Throughout all stages of instruction, observation and experiment in the laboratory and out of doors must be the method of study. Among the conditions of profitable object-lessons for children, the committee notes the following:—(1) Every pupil should have an object to himself, or at least be able to examine the object as long and as closely as he pleases. A drawing is not to be allowed to rank as an object. (2) Living and growing plants should be frequently observed. (3) The living plant should not only be studied in flower, but whenever the change of season brings on a new phase of growth. Fruits, buds, and seedlings are as important as flowers. (4) Experiment can hardly come in too early, and there is nothing else quite so stimulating. Even young children can appreciate the interest of a simple experiment, and they may be allowed to take part in it before they are able to conduct it themselves.

Where botany can be seriously studied, plant-physiology is recommended as the basis of work, on the ground of its great practical importance and of its special value as discipline when studied systematically. The seedlings of common garden plants are recommended as providing the best material for early lessons.

A course of lessons on seedlings can be so arranged as to lead the beginner to consider attentively the nutrition of a green plant, the adaptation of the plant to external circumstances, and the development of new parts. The course should bring in drawing to scale, the graphical representation of experimental results, the care of garden beds, the care of water cultures, and many other practical arts. It ought also to encourage the habit of close observation, the habit of methodically comparing structures which in different plants answer the same purpose, the love of experiment, and the unwillingness (so characteristic of the scientific mind) to accept any conclusion except as the result of an independent and careful judgment.

How school gardens can be made of value in connection with the teaching of botany is described in one section of the committee's report by Miss L. J. Clarke, whose work at the James Allen's Girls' School, Dulwich, has shown that botany can be made a practicable as well as practical school subject. Other sections of the report are devoted to school excursions, collecting—which is condemned when carried on for selfish ends and without any scientific purpose—initiative of the teacher, and the simplicity of appliances required for teaching purposes.

An interim report was presented by the committee on the influence of examinations on school curricula and of schools on university requirements. The report was drawn up by the chairman, Prof. H. E. Armstrong, and consisted of expressions of opinion received from heads of schools, university tutors, &c., upon subjects to which their attention was invited. While pointing out the many evils which attend examinations, the majority of the persons who favoured the committee with replies took the view that in some form they are necessary. It is generally recognised that there has been a marked tendency to develop and improve examinations of late years. Among other results of the inquiry the following are noteworthy:—The effect of specific examinations, both as affecting general training and as encouraging undue specialisation, either on the humanistic or on the scientific side, was considered to be bad in most cases. Opinion was practically unanimous as to the need of unifying examinations with the object in view, among others, that certain examinations may serve a common purpose, *e.g.* as qualifying examinations for entrance upon a course of professional study.

The need of preventing examinations from becoming stereotyped and behind the times, and thus discouraging the development of new or improved methods, was another subject submitted for opinions, and the replies expressed the general desire that examiners should confer with teachers in some organised way.

With regard to the possibility of arranging outside examinations so as to test what has really been taught in the school, leaving the teachers a freer hand than in the past and arranging for their cooperation on the examining board, in the setting of the questions, and in considering the answers, there appeared to be a strange disinclination to insist that the teacher should be trusted.

The extent to which certain subjects are to be regarded as necessary and others as optional evoked diverse expressions of opinion, and the general conclusion seemed to be that entrance examinations at Oxford and Cambridge do not tend to promote a good all-round education.

The report of the committee on the conditions of health essential to the carrying on of the work of instruction in schools consists almost entirely of two reports of subcommittees on (1) the essentials of school buildings; (2) eyesight in school children. The report of the subcommittee on the former subject forms a condensed *résumé* of scientific principles of school construction of a very practical character. It may be regarded as a contribution toward the realisation of the proposal that a short practical treatise should be drawn up by the committee. Its conclusions are of a general character, and are applicable to all classes of school buildings. The subcommittee on eyesight in school children has dealt with and reported on (*a*) the causes of defective eyesight in school children, and (*b*) the conditions requisite for preserving eyesight from injury in school life. Besides dealing with general principles involved, it makes some practical recommendations of much importance. One of these is that it should be required that school books should be "passed" in respect to their typographic standard and quality by some recognised hygienic authority before being adopted in schools. The necessity for a very considerable eye-working distance in all the exercises and instruction imposed upon young children is a condition which lies at the root of school hygiene.

There was a useful discussion on the teaching of geography at a joint meeting with the geographical section, but as a short account of this has already appeared in the report of the proceedings of that section, no further reference need be made to it here. R. A. G.

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